

英飞凌MOSFET功率晶体管

英飞凌IPA083N10NM5S OptiMOS™ 5 100 V 功率晶体管

特性

- 非常适合高频切换和同步整流
- 出色的栅极电荷 $\times R_{DS(on)}$ 乘积 (FOM)
- 极低的导通电阻 $R_{DS(on)}$
- N沟道, 正常电平
- 100% 雪崩测试
- 无铅镀层; 符合RoHS标准
- 符合 IEC61249-2-21 标准的无卤素



产品验证

符合 JEDEC 标准。

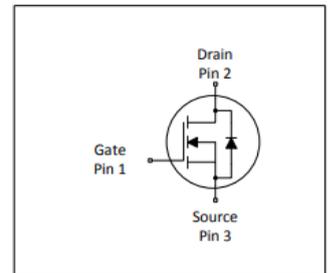


表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on),max}$	8.3	$m\Omega$
I_D	50	A
Q_{oss}	41	nC
$Q_G(0V..10V)$	30	nC



Type / Ordering Code	Package	Marking	Related Links
IPA083N10NM5S	PG-TO 220 FullPAK	083N105S	-

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1 最大额定值

除非另有规定, $T_A = 25\text{ °C}$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	-	-	50 35	A	$V_{GS}=10\text{ V}, T_C=25\text{ °C}$ $V_{GS}=10\text{ V}, T_C=100\text{ °C}$
Pulsed drain current ¹⁾	$I_{D,pulse}$	-	-	200	A	$T_C=25\text{ °C}$
Avalanche energy, single pulse ²⁾	E_{AS}	-	-	83	mJ	$I_D=50\text{ A}, R_{GS}=25\text{ }\Omega$
Gate source voltage	V_{GS}	-20	-	20	V	-
Power dissipation	P_{tot}	-	-	36	W	$T_C=25\text{ °C}$
Operating and storage temperature	T_j, T_{stg}	-55	-	175	°C	IEC climatic category; DIN IEC 68-1: 55/175/56

2 热特性

表 3 热特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	4.2	°C/W	-

3 电气特性

除非另有规定, $T_j = 25\text{ °C}$

表 4 静态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	100	-	-	V	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2.2	3.0	3.8	V	$V_{DS}=V_{GS}, I_D=49\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	0.1 10	1 100	μA	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$ $V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	1	100	nA	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	7.1 8.6	8.3 -	m Ω	$V_{GS}=10\text{ V}, I_D=25\text{ A}$ $V_{GS}=6\text{ V}, I_D=13\text{ A}$
Gate resistance ³⁾	R_G	-	1.0	-	Ω	-
Transconductance	g_{fs}	-	59	-	S	$ V_{DS} \geq 2 I_D R_{DS(on)max}, I_D=25\text{ A}$

¹⁾详细信息请参见图 3

²⁾详细信息请参见图 13

³⁾由设计标定, 不受制于生产测试。

表 5 动态特性

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance ¹⁾	C_{iss}	-	2100	2700	pF	$V_{GS}=0\text{ V}, V_{DS}=50\text{ V}, f=1\text{ MHz}$
Output capacitance	C_{oss}	-	340	-	pF	$V_{GS}=0\text{ V}, V_{DS}=50\text{ V}, f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	16	-	pF	$V_{GS}=0\text{ V}, V_{DS}=50\text{ V}, f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	-	15	-	ns	$V_{DD}=50\text{ V}, V_{GS}=10\text{ V}, I_D=33\text{ A}, R_{G,ext}=1.6\ \Omega$
Rise time	t_r	-	5	-	ns	$V_{DD}=50\text{ V}, V_{GS}=10\text{ V}, I_D=33\text{ A}, R_{G,ext}=1.6\ \Omega$
Turn-off delay time	$t_{d(off)}$	-	24	-	ns	$V_{DD}=50\text{ V}, V_{GS}=10\text{ V}, I_D=33\text{ A}, R_{G,ext}=1.6\ \Omega$
Fall time	t_f	-	5	-	ns	$V_{DD}=50\text{ V}, V_{GS}=10\text{ V}, I_D=33\text{ A}, R_{G,ext}=1.6\ \Omega$

表 6 栅极电荷特性²⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	10	-	nC	$V_{DD}=50\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	6	-	nC	$V_{DD}=50\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}	-	6	-	nC	$V_{DD}=50\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}	-	10	-	nC	$V_{DD}=50\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total ¹⁾	Q_g	-	30	40	nC	$V_{DD}=50\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	4.6	-	V	$V_{DD}=50\text{ V}, I_D=25\text{ A}, V_{GS}=0\text{ to }10\text{ V}$
Gate charge total, sync. FET	$Q_{g(sync)}$	-	26	-	nC	$V_{DS}=0.1\text{ V}, V_{GS}=0\text{ to }10\text{ V}$
Output charge	Q_{oss}	-	41	-	nC	$V_{DD}=50\text{ V}, V_{GS}=0\text{ V}$

表 7 反向二极管

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	30	A	$T_C=25\text{ }^\circ\text{C}$
Diode pulse current	$I_{S,pulse}$	-	-	200	A	$T_C=25\text{ }^\circ\text{C}$
Diode forward voltage	V_{SD}	-	0.87	1.2	V	$V_{GS}=0\text{ V}, I_F=25\text{ A}, T_J=25\text{ }^\circ\text{C}$
Reverse recovery time ¹⁾	t_{rr}	-	55	-	ns	$V_R=50\text{ V}, I_F=25\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge ¹⁾	Q_{rr}	-	95	-	nC	$V_R=50\text{ V}, I_F=25\text{ A}, di_F/dt=100\text{ A}/\mu\text{s}$

¹⁾由设计标定, 不受制于生产测试。

²⁾参数定义 请参见“栅极充电波形”

4 电气特性图

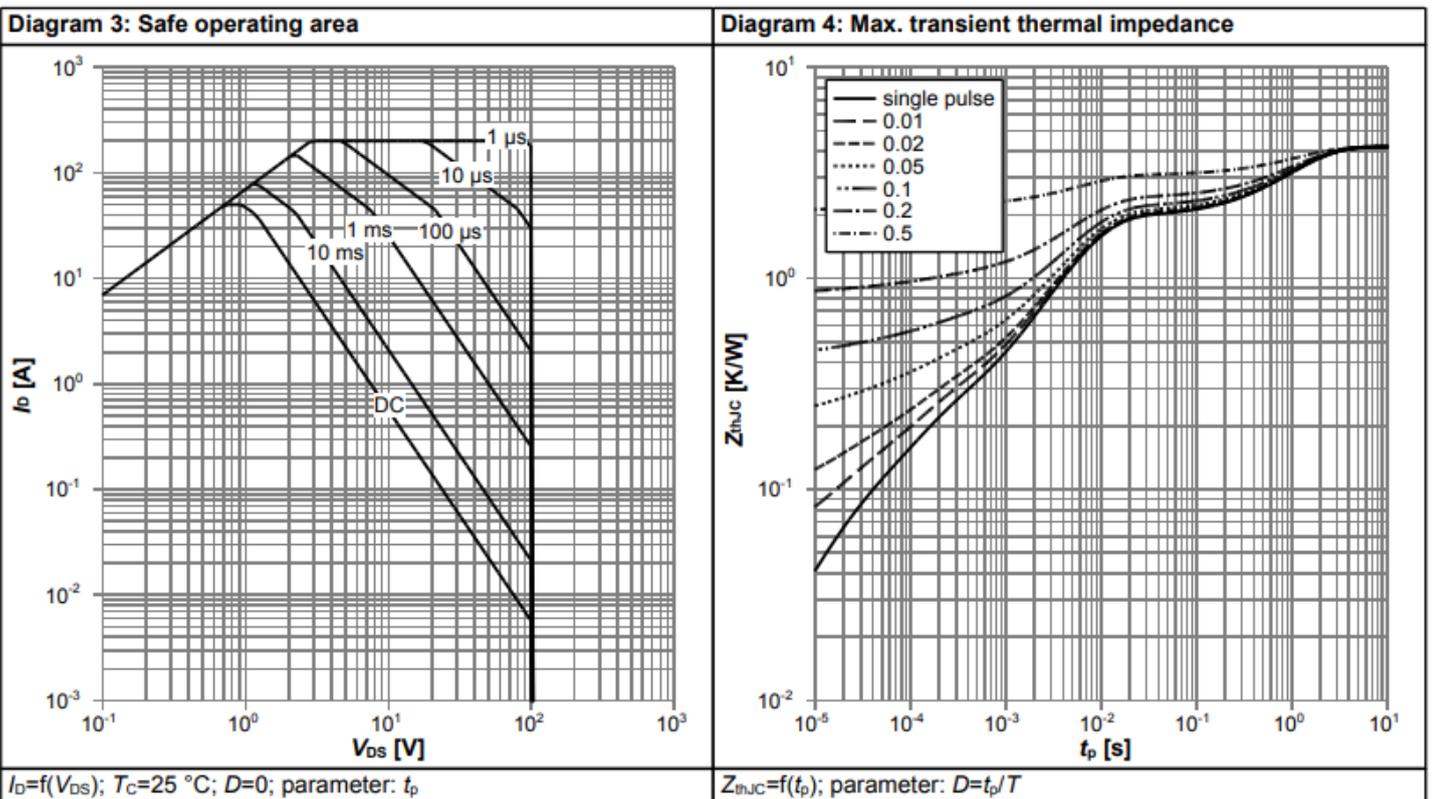
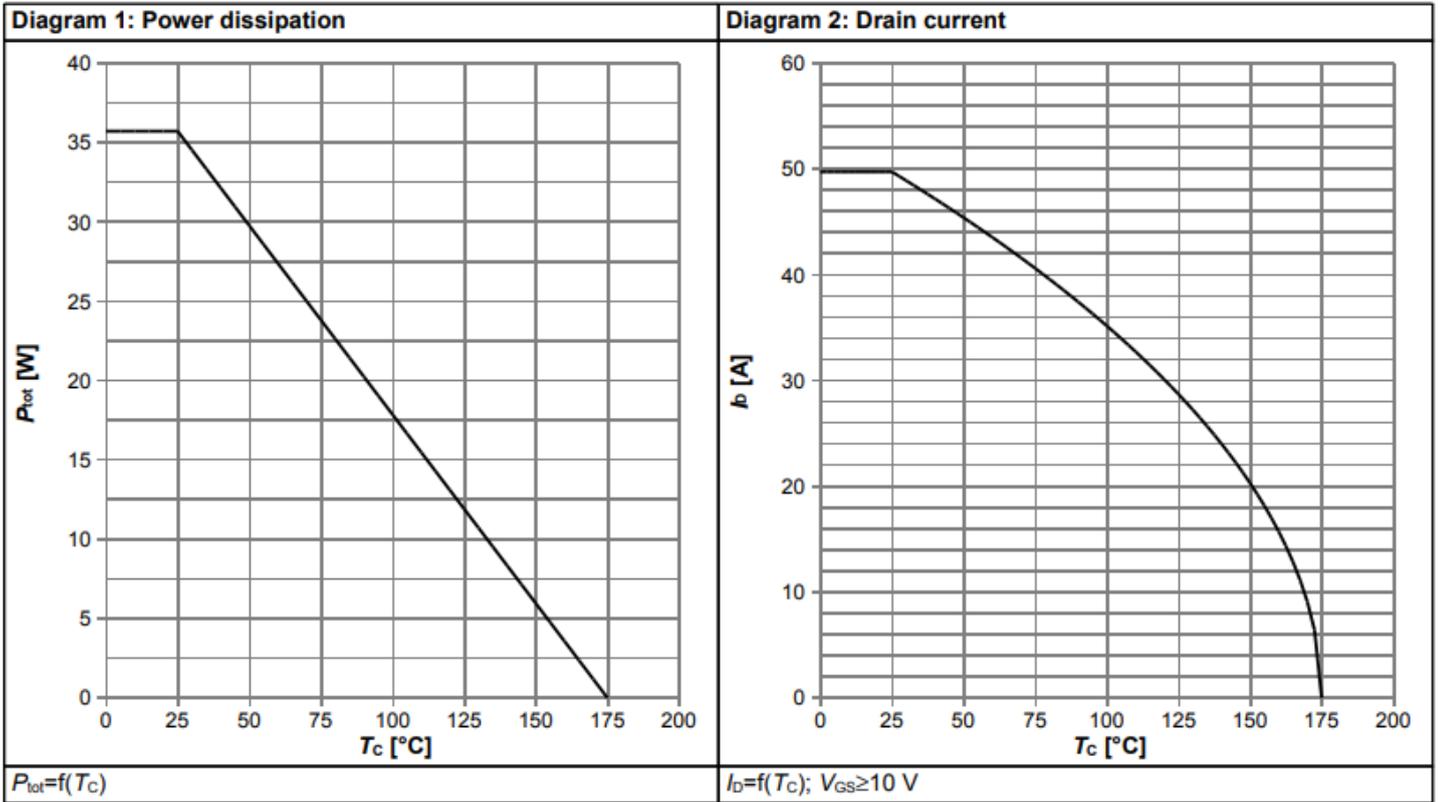
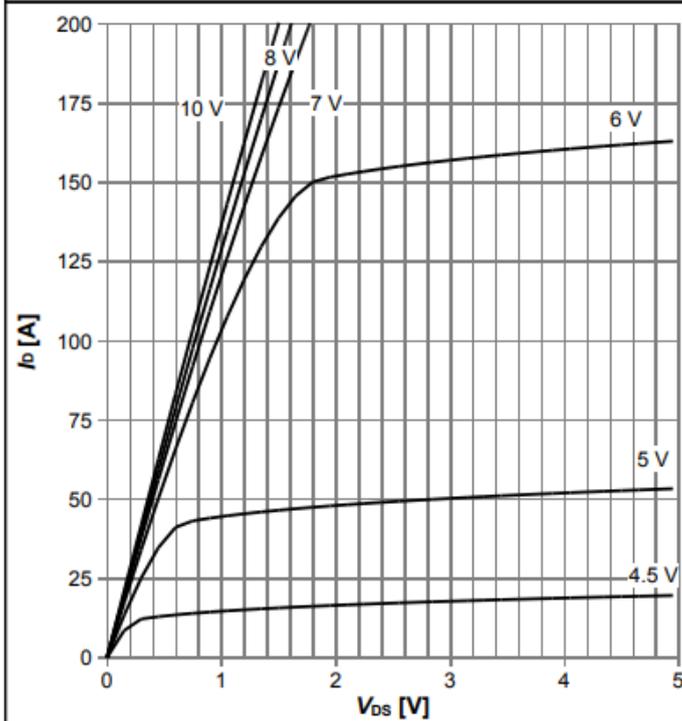
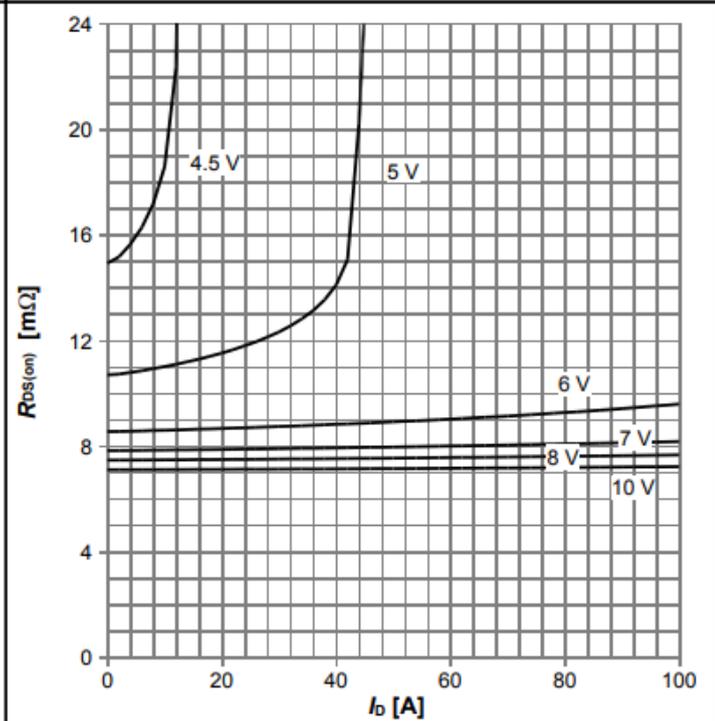


Diagram 5: Typ. output characteristics



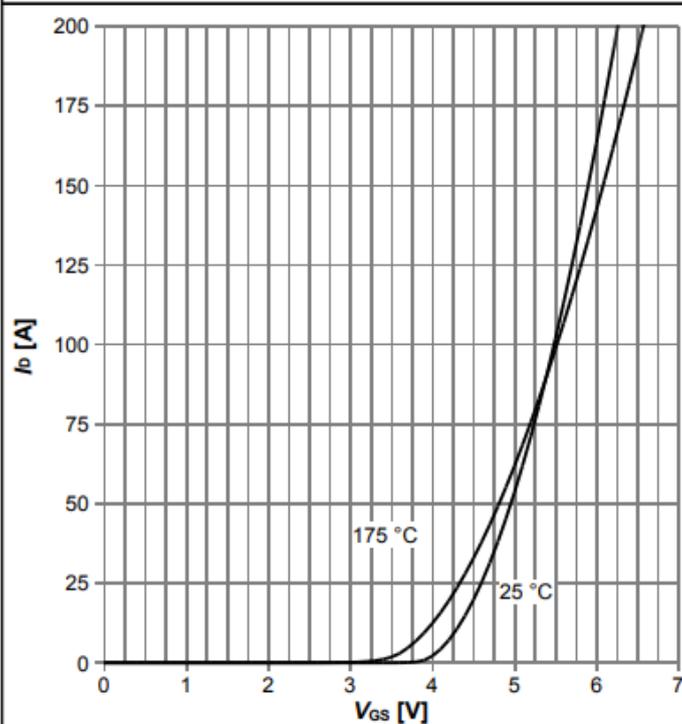
$I_D = f(V_{DS}), T_j = 25\text{ }^\circ\text{C};$ parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



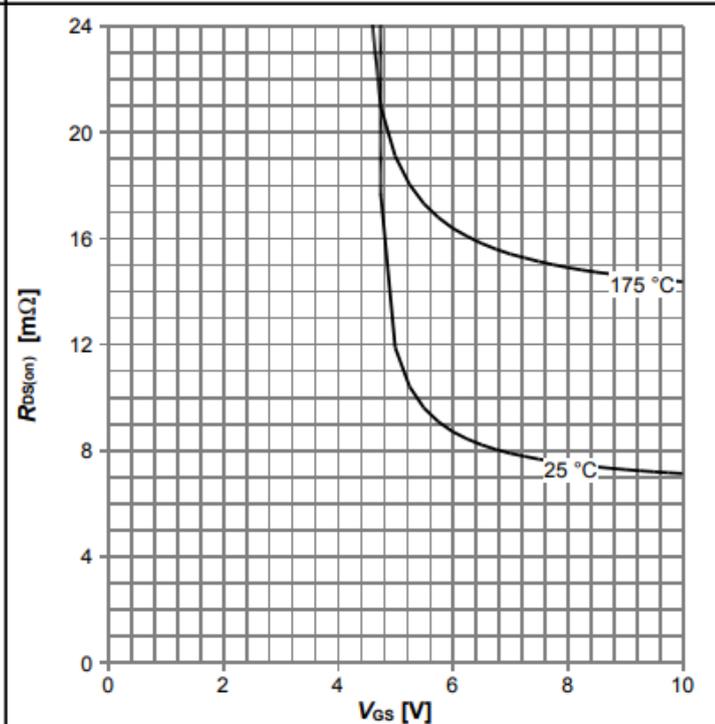
$R_{DS(on)} = f(I_D), T_j = 25\text{ }^\circ\text{C};$ parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



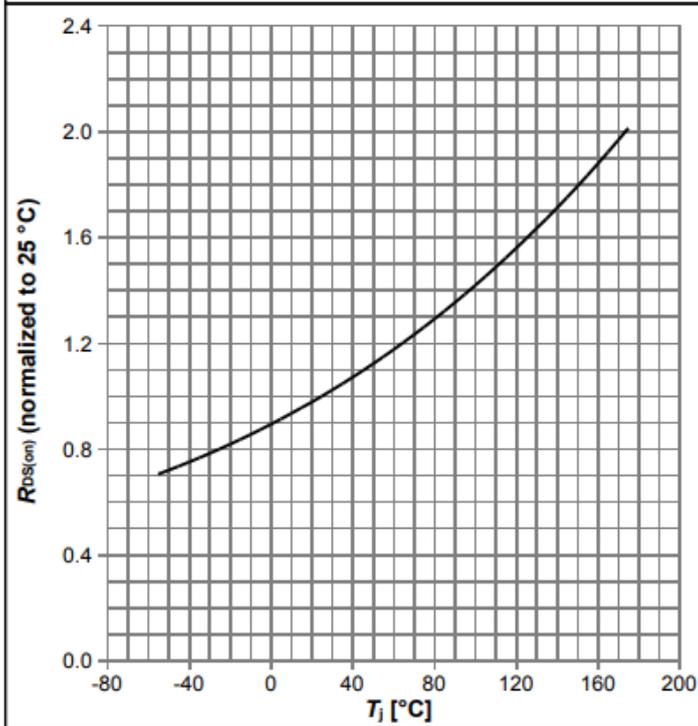
$I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max};$ parameter: T_j

Diagram 8: Typ. drain-source on resistance



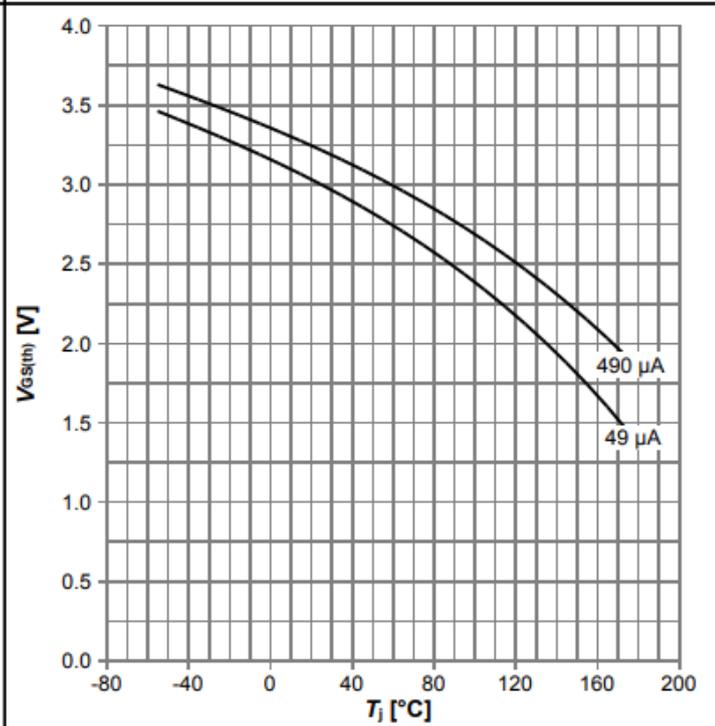
$R_{DS(on)} = f(V_{GS}), I_D = 25\text{ A};$ parameter: T_j

Diagram 9: Normalized drain-source on resistance



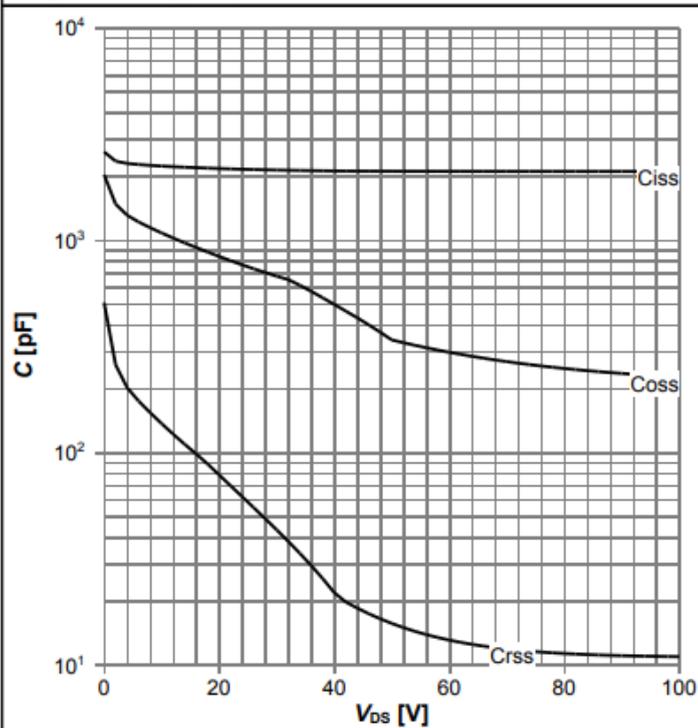
$R_{DS(on)}=f(T_j), I_D=25\text{ A}, V_{GS}=10\text{ V}$

Diagram 10: Typ. gate threshold voltage



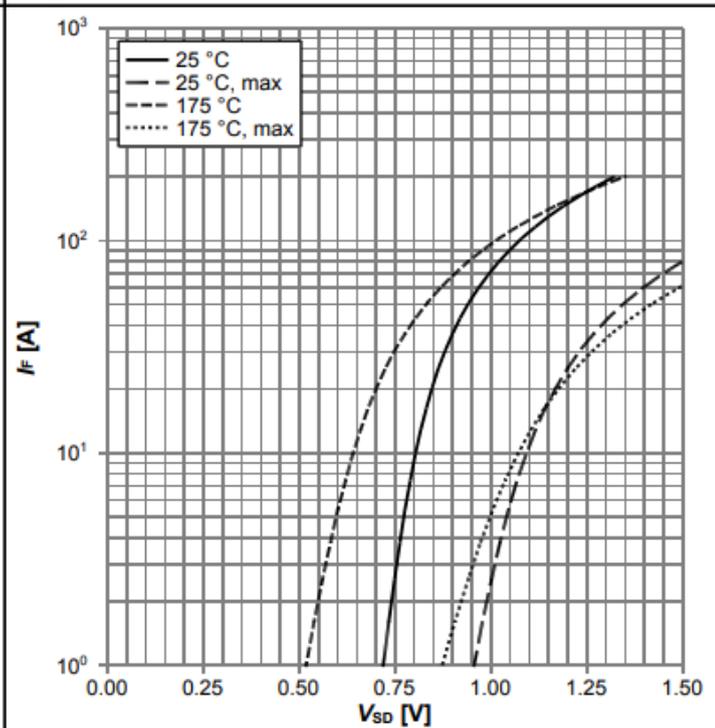
$V_{GS(th)}=f(T_j), V_{GS}=V_{DS};$ parameter: I_D

Diagram 11: Typ. capacitances



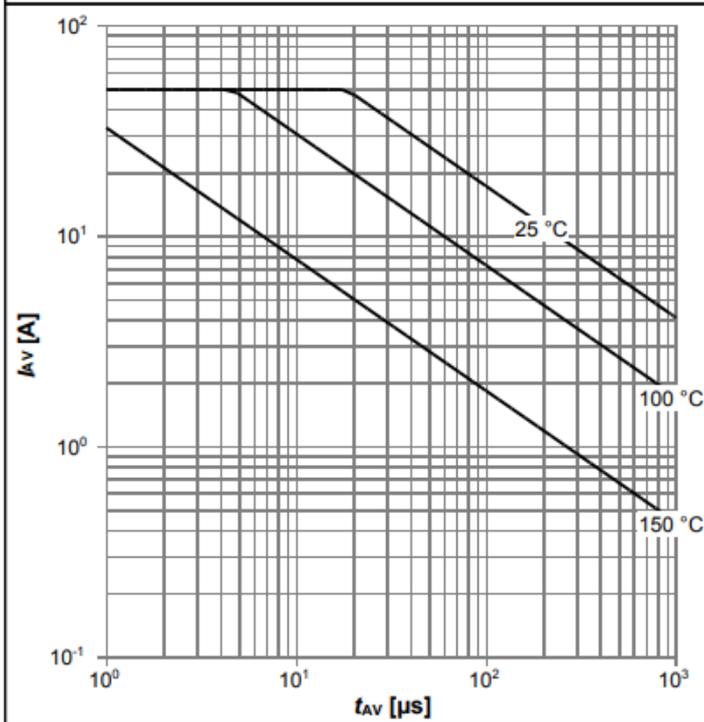
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$

Diagram 12: Forward characteristics of reverse diode



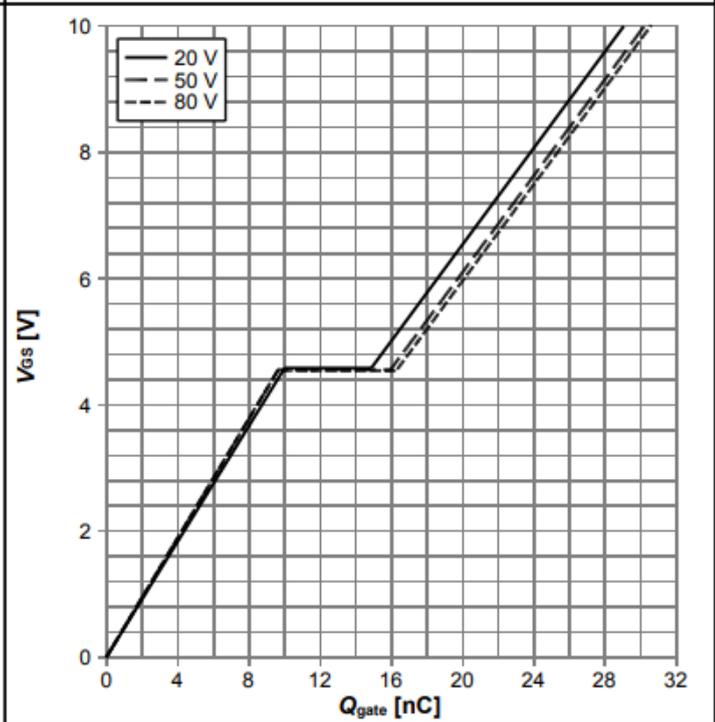
$I_F=f(V_{SD});$ parameter: T_j

Diagram 13: Avalanche characteristics



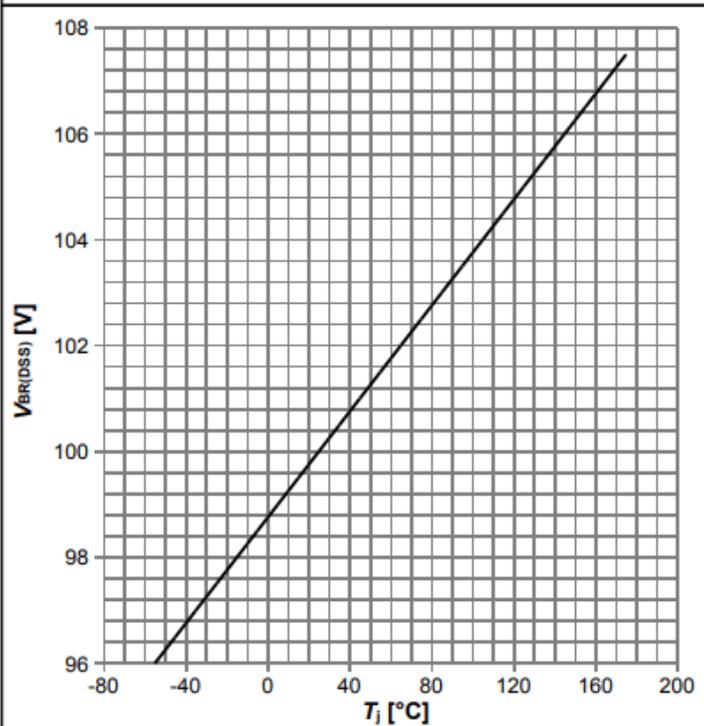
$I_{AS}=f(t_{AV})$; $R_{GS}=25 \Omega$; parameter: $T_{j,start}$

Diagram 14: Typ. gate charge



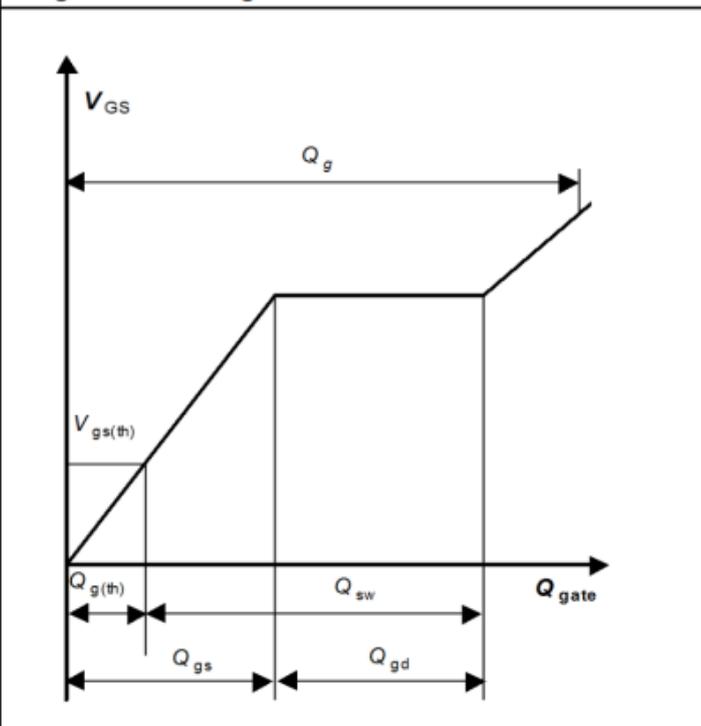
$V_{GS}=f(Q_{gate})$, $I_D=25$ A pulsed, $T_j=25$ °C; parameter: V_{DD}

Diagram 15: Drain-source breakdown voltage

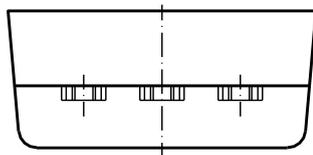
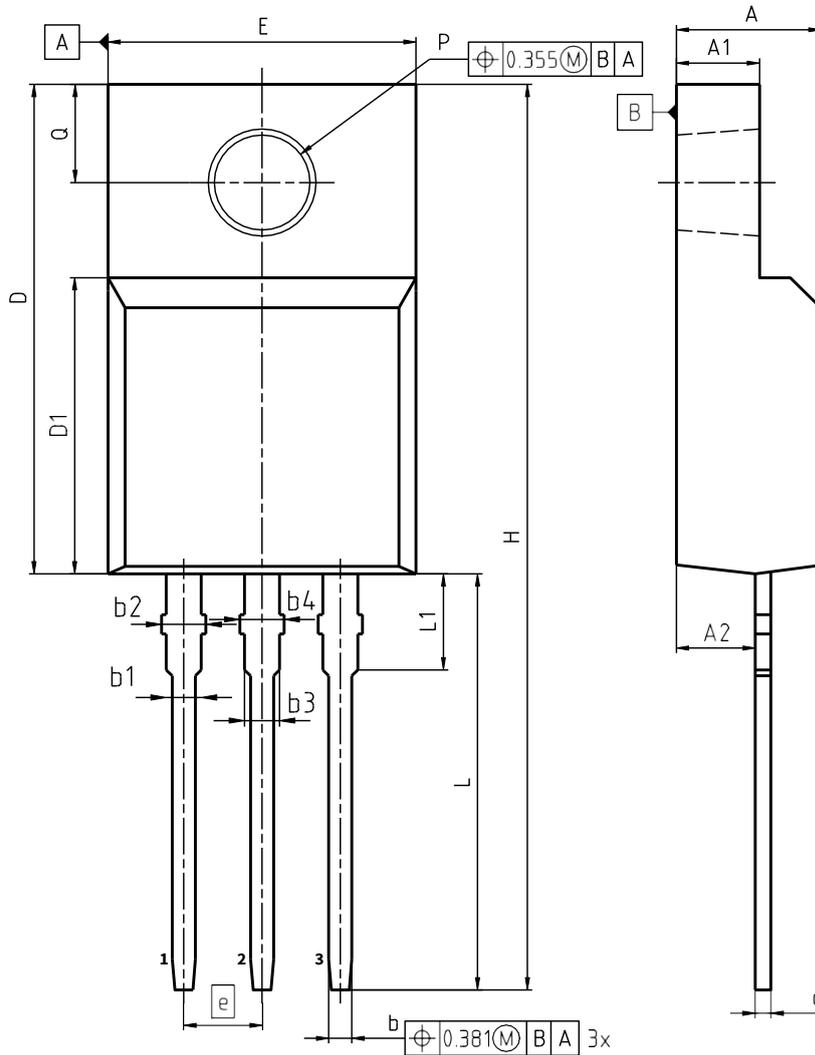


$V_{BR(DSS)}=f(T_j)$; $I_D=1$ mA

Diagram Gate charge waveforms



5 封装外形



NOTES:
STANDARD QUALITY GRADE
DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS

DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	4.50	4.90
A1	2.34	2.80
A2	2.42	2.86
b	0.65	0.90
b1	0.95	1.38
b2	1.20	1.50
b3	0.65	1.38
b4	1.20	1.50
c	0.40	0.63
D	15.67	16.15
D1	8.97	9.83
E	10.00	10.65
e	2.54	
H	28.70	29.75
L	12.78	13.75
L1	2.83	3.45
øP	3.00	3.38
Q	3.15	3.50

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EUROPEAN PROJECTION

图 1 PG-TO 220 FullPAK 封装外形图, 尺寸单位为毫米/英寸

修订记录

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历史修订版本

Revision	Date	Subjects (major changes since last revision)
2.0	2019-07-26	Release of final version
2.1	2019-09-02	Update package outline

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